

- W. B. No. 140. Forests and rainfall. H. A. Hazen. 8vo. 2 pp. 1897. (Reprint, M. W. R.)
- * W. B. No. 142. The probable state of the sky along the path of total eclipse of the sun, May 28, 1900. F. H. Bigelow. 8vo. 7 pp. 1 chart. 1897. (Reprint, M. W. R.)
- * W. B. No. 145. Highest kite ascension at Blue Hill. S. P. Fergusson. 8vo. 4 pp. 1897. (Reprint, M. W. R.)
- W. B. No. 148. An improved sunshine recorder. D. T. Marling. 8vo. 15 pp. 1897. (Reprint, M. W. R.)
- W. B. No. 149. A winter barograph curve from the South Pacific Ocean. R. de C. Ward. 8vo. 8 pp. 1897. (Reprint, M. W. R.)
- W. B. No. 159. Wrecks and casualties on the Great Lakes, 1895, 1896, and 1897. Norman B. Conger. 8vo. 20 pp. 3 charts. 1898.
- W. B. No. 162. Normal annual sunshine and snowfall. A. J. Henry. 4to. 5 pp. 1898.
- W. B. No. 166. Instructions for aerial observers. Circular K, Instrument Division. C. F. Marvin. 8vo. 33 pp. 1898.
- W. B. No. 168. Cyclonic circulation and the translatory movement of West Indian hurricanes. Rev. Benito Vifies, S. J. 8vo. 34 pp. 1898.
- W. B. No. 171. Moisture tables. C. F. Marvin. 8vo. 9 pp. 1898. (Reprint, M. W. R.)
- * W. B. No. 179. The probable state of the sky along the path of total eclipse of the sun, May 28, 1900. F. H. Bigelow. 8vo. 8 pp. 1898. (Reprint, M. W. R.)
- W. B. No. 180. Aneroid barometers. C. F. Marvin. 8vo. 6 pp. 1898. (Reprint, M. W. R.)
- * W. B. No. 188. Climate and crop report, Alaska section. H. L. Ball. 8vo. 7 pp. 1899. (Reprint, M. W. R.)
- W. B. No. 193. Measurement of precipitation. Circular E, Instrument Division. C. F. Marvin. 8vo. 28 pp. 1899.
- * W. B. No. 194. Hydrology of the Lake Minnetonka watershed. S. W. Corley. 8vo. 10 pp. 1899. (Reprint, M. W. R.)
- W. B. No. 199. Property loss by lightning, 1898. A. J. Henry and A. G. McAdie. 8vo. 16 pp. 1899. (Extract from Bulletin No. 26.)
- W. B. No. 201. Climatology of the Isthmus of Panama. H. L. Abbot. 8vo. 19 pp. 1899. (Reprint, M. W. R.)
- W. B. No. 202. An advance in measuring and photographing sounds. B. F. Sharp. 8vo. 18 pp. 1899. (Reprint, M. W. R.)
- * W. B. No. 203. Variations in lake levels and atmospheric precipitation. A. J. Henry. 8vo. 8 pp. 1899. (Reprint, M. W. R.)
- W. B. No. 223. Anemometer tests. C. F. Marvin. 8vo. 18 pp. 1900. (Reprint, M. W. R.)
- W. B. No. 227. Daily river stages. Principal rivers of the United States. Part VI, 1896-1899. Weather Bureau. 4to. 446 pp. 1900.
- W. B. No. 228. Tables of daily precipitation for 1893-1895, inclusive. (Completed only to "P.") Weather Bureau. 8vo. 256 pp. 1900.
- W. B. No. 231. Report of the Chief of the Weather Bureau. 1900. 8vo. 15 pp.
- W. B. No. 233. Anemometry. Circular D, Instrument Division. C. F. Marvin. 8vo. 67 pp. 1900.
- W. B. No. 235. Psychrometric tables. C. F. Marvin. 8vo. 84 pp. 1900.
- W. B. No. 237. Meteorological chart of the Great Lakes for season of 1900. A. J. Henry and N. B. Conger. 4to. 23 pp. 1901.
- W. B. No. 241. Barometers and measurement of atmospheric pressure. Circular F, Instrument Division. C. F. Marvin. 8vo. 94 pp. 1901.

WIND AND TEMPERATURE.

A correspondent has proposed the following question :

Given, a close fence 12 or 14 feet high running from the northeast to the southwest, or directly athwart a blizzard from the northwest, a thermometer being on each side of the fence about 5 feet from the ground. If the thermometer on the north side indicates 15° above zero what will the instrument on the lee side show?

I know from practical experience the great and appreciable difference in the two sides to animal life but have no knowledge of the effect these two positions of the thermometer have upon the mercury. Will you kindly tell me? If, as some claim, there is very little, then why should a man exposed on the north side freeze to death, while on the south side he would survive without much injury? In one case the cold cuts to the marrow, in the other by buttoning up one's coat only a chilly sensation is experienced. Is not vegetable life in this particular affected much the same as animal life, or in other words would not a tender tree on each side of this high fence fare much the same as two men, one on each side of it?

There is no appreciable difference between the temperature of the air on the windward and leeward sides of a fence, or of any other form of windbreak. Animals seek shelter from the wind for the reason that it conveys away the heat of their bodies much faster than does the quiet air, since the covering provided for their protection by nature is not impervious to strong winds. For the same reason, a man will perish in a high wind with a temperature that would cause him little discomfort in a calm, since in the presence of a strong wind his clothing is incapable of retaining his bodily heat.

The lowest temperatures and those that produce frosts and destruction to vegetation usually occur after the wind has died down, and are due to excessive radiation of heat from the ground and from the plants into space. Under these conditions the plants are sometimes colder than the air itself, so that a fence could be of no possible use to the plants; in fact it is well known that under these circumstances a wind brings warm air to prevent frost.

When a cold wave is coming on, the plants are, of course, cooled by the cold air that is continually passing by them, and if this cold air can be held back and the warm air retained the plants will be protected; but a fence on the windward side of the field would hardly effect this, since cold air has a tendency to descend to the ground and warm air to rise. A covering of some sort is therefore the only means of retaining the desired heat, and the same covering will also prevent the lowering of the temperature by radiation.

It is for these reasons that the Weather Bureau in its publications has always advocated screens, smudges, etc., as a protection against frost.

REDUCTION TO STANDARD GRAVITY AT MEXICAN STATIONS.

In order to correct the barometer for the variations in gravity we have to consider the fact that not only does the force of gravity, combined with the centrifugal force due to the diurnal rotation of the earth, vary with the latitude of the station, but there is also a small variation depending on the altitude of the station above sea level and the mass of the mountain or plateau on which the station rests. Some account of this problem has been given in the MONTHLY WEATHER REVIEW for December, 1896, p. 463, July, 1898, p. 314, and December, 1898, p. 550, at least in so far as concerns the United States. In Mexico the problem of the reduction to standard gravity is one of special importance, since great differences of altitude occur at stations very close together. As all Mexican stations, so far as they are mentioned in the accompanying table, use mercurial barometers, the corrections have therefore been computed by Señor Pastrana according

to the rules and tables given in the International Meteorological Tables, published by the International Committee in 1890. These computations will be subject to slight revision whenever the actual force of gravity shall have been determined at these stations. In reducing observations published in earlier numbers of the MONTHLY WEATHER REVIEW so as to be comparable with those published in the MONTHLY WEATHER REVIEW for May, and succeeding months, the following table will be convenient. It has already been adopted by the Central Observatory of Mexico, and was first used in reducing the Mexican data for May.

Table for reducing local barometric pressures by mercurial barometers at Mexican stations to standard gravity.

Station and observatories.	Metric system.			English system.		
	Latitude term.	Altitude term.	Total.	Latitude term.	Altitude term.	Total.
	<i>Mm.</i>	<i>Mm.</i>	<i>Mm.</i>	<i>Inch.</i>	<i>Inch.</i>	<i>Inch.</i>
Chihuahua (Obs. d. Est.).....	-0.90	-0.18	-1.08	-0.035	-0.007	-0.042
Colima (Sem.).....	-1.46	-0.07	-1.53	-0.058	-0.003	-0.061
Culiacan (Est.).....	-1.27	-0.00	-1.27	-0.050	-0.000	-0.050
Durango (Est.).....	-1.06	-0.22	-1.28	-0.043	-0.009	-0.051
Guadalajara (Hos. d. Belen).....	-1.23	-0.19	-1.42	-0.048	-0.007	-0.055
Guanaajuato (Est.).....	-1.15	-0.24	-1.39	-0.045	-0.009	-0.054
Jalapa (Est.).....	-1.31	-0.18	-1.49	-0.052	-0.007	-0.059
Leon (Est.).....	-1.19	-0.22	-1.41	-0.047	-0.009	-0.056
Linares (Obs. particular).....	-1.23	-0.05	-1.28	-0.048	-0.002	-0.050
Mazatlan (Obs. Ast. and Met.).....	-1.36	-0.00	-1.36	-0.054	-0.000	-0.054
Merida (Est.).....	-1.43	-0.00	-1.43	-0.056	-0.000	-0.056
Mexico (Obs. Cent.).....	-1.18	-0.26	-1.44	-0.046	-0.010	-0.056
Monterrey (Est.).....	-1.16	0.07	-1.23	-0.046	-0.003	-0.059
Morelia (Sem.).....	-1.22	-0.23	-1.45	-0.048	-0.009	-0.057
Oaxaca (Est.).....	-1.36	-0.20	-1.56	-0.054	-0.008	-0.062
Pachuca (Est.).....	-1.13	-0.27	-1.40	-0.044	-0.011	-0.055
Puebla.....	-1.21	-0.26	-1.47	-0.048	-0.010	-0.058
Queretaro (E-t.).....	-1.20	-0.23	-1.42	-0.047	-0.009	-0.056
Real del Monte (Comp. Minera).....	-1.09	-0.30	-1.39	-0.043	-0.013	-0.055
Saltillo (Col. S. Juan Nepomuceno).....	-1.03	-0.20	-1.23	-0.041	-0.008	-0.049
San Luis Potosi (Inst. Cient.).....	-1.14	-0.23	-1.36	-0.045	-0.009	-0.054
Tampico (Hos. Mil.).....	-1.41	-0.00	-1.41	-0.056	-0.000	-0.056
Toluca (Est.).....	-1.13	-0.30	-1.43	-0.044	-0.012	-0.056
Tuxtla Gutierrez (Est.).....	-1.55	-0.08	-1.63	-0.061	-0.003	-0.064
Zacatecas (Est.).....	-1.04	-0.27	-1.31	-0.041	-0.011	-0.052
Zapotlan (Sem.).....	-1.28	-0.19	-1.47	-0.050	-0.007	-0.057

SNOWFALL AND ITS EQUIVALENT IN WATER.

Prof. A. G. McAdie, Forecast Official, San Francisco, calls attention to the snowfall at Fordyce, Cal., on February 8. The voluntary observer, Mr. E. E. Roeming, carefully measured the depth of the snow on this occasion as being 36 inches, but when melted it amounted only to 1.70, and he adds that when the temperature is only 15° F. during the snowfall, it takes a large amount to make an inch of water. The ratio of snow to water in this case is as 21 to 1, and Professor McAdie states that he has been told by reliable observers in the mountains of California that a ratio of 17 to 1 sometimes prevails.

Of course it is well known that the ratio of 10 to 1, which is used by the Weather Bureau when there have been no actual measurements of the melted water, is at best a crude approximation, since the ratio may vary anywhere between 3 and 20. The ratio of 21 to 1 observed on February 8 by Mr. Roeming is rare, but by no means unique. In fact, other measurements made by him during the same month of March give the following ratios:

March 2, 20; March 3, 20; March 4, 17; March 5, 7.5; March 6,—; March 7, 20; March 8, 21; March 18, 8; March 19, 2.5.

All these snowfalls occurred with southeast or southwest winds. The temperatures are not given on his monthly form. There are many days on which the depth of snowfall is not given, so that the total monthly snowfall of 107 inches and the total equivalent precipitation, 16.34, may not be precisely comparable. As they stand, however, they give an average ratio of snowfall to melted water 6.5 to 1.

HAIL INSURANCE.

In a clipping from the Advance, of Stillwater, Okla., we note that a severe hailstorm devastated a strip of country 4 miles wide and 18 miles long near El Reno, Okla., on May 15. The report states that live stock was killed, and wheat fields, orchards, and all growing crops within the storm's path were totally destroyed. The loss was estimated at \$80,000, but a part of this was covered by hail insurance. The placing of insurance against loss from this source was commended in the April number of the MONTHLY WEATHER REVIEW.

A fall of hail to the average depth of 1 inch over a region 4 miles wide and 18 miles long is a fall of 167,340,000 cubic feet of ice. Ice weighs between 55 and 57 pounds per cubic foot. This total mass, therefore, represents very nearly 1,000,000 tons (2,000 pounds to the ton). But this mass must have been raised up from the ocean level to that of the clouds by some previous meteorological agency. The average elevation from which it fell may be taken as 5,000 feet. Now to raise 1,000,000 tons 5,000 feet is to do 5,000,000 foot-tons of work. But in estimating the power of an engine to do work we speak of foot-pounds per minute or horsepower; we say 1-horsepower is the ability to raise 33,000 pounds 1 foot in 1 minute; therefore, an engine of 1-horsepower is able to raise almost exactly 1,000 tons one foot in one hour, or one-fifth of a ton 5,000 feet in one hour, or 1 ton 5,000 feet in five hours. The work of raising 1,000,000 tons of ice by evaporation from the ocean water up to the level of the clouds may therefore be considered as representing the work done by an engine of 1,000,000 horsepower, and therefore represents the work of a 1,000,000-horsepower engine working for five hours. When this ice falls to the ground the force of gravity does the same amount of work upon it that the local winds had done in raising it to the cloud level against the force of gravity. If we are to prevent the ice from falling we must do this same amount of work per hour, or we must work at the same rate per hour and must keep up the work as long as the hail is to be held up, but it does not seem likely that man will ever be able to invent any method that can accomplish this result. Certainly the discharge of a few cannon will not do it.

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. S. M. Blandford, Observer, Boise, Idaho, reports that he lectured before the graduating class of the high school of that city on May 16 on the organization, growth, and functions of the Weather Bureau. The class, with its instructors, also visited the Weather Bureau office, and the various instruments were explained by the observer.

At Phoenix, Ariz., on May 22, Mr. W. G. Burns, Section Director, explained the use of the various instruments, and, by means of a series of weather maps, showed the movements of cyclones and anticyclones and the attendant weather changes, to an advanced class from the local high school.

At San Diego, Cal., on May 15, the senior class of the San Diego Normal School was entertained at the local Weather Bureau office by Observer Ford A. Carpenter, who gave an informal talk on the general work of the Bureau and explained the causes of some of the local peculiarities of climate.

Local Forecast Official I. M. Cline lectured to the South Texas Truck Growers' Association, at Edna, Tex., on May 9.

Section Director T. B. Jennings lectured on the weather and the Weather Bureau before the teachers and older scholars of the Lincoln School at Topeka, Kans., on May 29.

Observer Charles E. Linney lectured on the weather and weather forecasting before the Ladies' Aid Society of the Union Congregational Church at Auburn Park, Chicago, Ill.,